

NASA Armstrong Flight Research Center

Requirements for Hybrid Motor System

Ground Use Only

5/27/2014

Description: A hybrid motor system is being solicited for the purposes of investigating operation, efficiency, and stability of shaft coupled turbine electric motor configurations at NASA. The static ground test stand will be developed at NASA Armstrong Flight Research Center. Below are the requirements for the procurement of the hybrid motor system.

1. Hybrid Motor System Requirements

- 1.1. The hybrid motor system shall consist of a motor-generator and an inverter-controller.
- 1.2. The hybrid motor system shall accept user RPM (revolutions per minute) or torque commands via CANBus communication.
- 1.3. The hybrid motor system shall report its performance and health status to the user via CANBus communication (shaft RPM, torque, motor voltage, current, winding temperature at a minimum).
- 1.4. The manufacturer shall provide a document detailing the CANBus message information and available health monitoring parameters, including rate, conversion, and calibration equations.
- 1.5. The hybrid motor system shall be capable of charging lithium based batteries when the system is generating energy.
- 1.6. The hybrid motor system shall be delivered within maximum of 10 weeks after receiving order.
- 1.7. The hybrid motor system shall come from the manufacturer's product family that has been in field service by outside customers.
- 1.8. The hybrid motor system shall be able to operate in the modes shown in Figure 1.

2. Motor-Generator Specific Requirements

- 2.1. The motor-generator output shaft shall be freewheeling when the RPM or torque command is zero.
- 2.2. The motor-generator shall be able to produce electricity when rotating in either clockwise or counterclockwise direction.
- 2.3. Motor type: Permanent Magnet AC
- 2.4. Power density: 1.9 kW/kg or higher
- 2.5. Nominal operating voltage: 600VDC
- 2.6. Max operating voltage: 800VDC or higher
- 2.7. Rated Peak Torque: 700 Nm or higher
- 2.8. Rated Stall Torque: Greater than 400 Nm
- 2.9. Peak Power: Greater than 300 kW @600VDC
- 2.10. Rated Shaft output power: 200 kW or greater @600VDC
- 2.11. Peak Stall Current: Greater than 800 Amp DC

- 2.12. Continuous Stall Current: Greater than 400 Amp DC
- 2.13. Nominal continuous operating speed: 6,000 RPM
- 2.14. Rotor Inertia: 0.07 kg-m² or less
- 2.15. Motor Weight: Less than 110 kg
- 2.16. Cooling: Liquid cooled (water/glycol) or air cooled.
- 2.17. Output shaft geometry: Spline shaft.

3. Inverter-Controller Requirements

- 3.1. Compatible with AC motor-generator
- 3.2. Nominal Operating Voltage: 600 VDC
- 3.3. Max Operating Voltage: 800 VDC or higher
- 3.4. Constant voltage or constant current battery charging capability
- 3.5. Peak Current Output: 800 amps rms or higher
- 3.6. Continuous Current Output: 580 amps or higher
- 3.7. IGBT Switching Frequency 40 or 8.0 kHz
- 3.8. Weight: Less than 40 kg

4. Quantities Required

- 4.1. Two motor-generators
- 4.2. One inverter-controller.

PR Number:
If Service, POP:
Requirements:

Part Number	Description	Qty
C-GVM210-400XXX-600090	Motor Generator	2
LA472220U001	MA5 Motor Controller	1
170-00506-04	Feedback Cable	1

GSA Schedule? No
If so, GSA Contract Number: